

# 505LST

## for Large Steam Turbines

### Applications

The 505LST digital control is designed to control large power-generation-based reheat steam turbines with up to 4 modulating valves (up to 6 valves with the use of external drivers).

This control performs turbine speed control off-line, and throttle pressure or valve position control on-line. Full-arc partial-arc transfers are accomplished on- or off-line depending on the unit's configuration. Valve testing can be done automatically or manually from the control's front service panel, or remotely via discrete commands.

Depending on the programmed configuration, overspeed valve regulation is achieved via throttle and or intercept valves.

The 505LST can be configured to operate as a stand-alone unit or in conjunction with a plant's Distributed Control System.

### Description

The 505LST is a field-programmable digital control that has an application software program designed to control multi-valve reheat steam turbines driving utility-paralleled generators.

This control's hardware package consists of printed circuit boards in an enclosure designed to be mounted within a system control panel. Removable terminal blocks allow for easy wiring and installation.

The 505LST is programmed through the control's front service panel via a user-friendly menu-driven software program.

An Operator Control Panel is provided on the 505LST's front panel. Easy to follow instructions are presented in English through the OCP's two-line display, and operators can view actual and setpoint values from the same screen.

### Protection

Emergency trip commands can be performed from the control's front panel, hardwired discrete commands, or through serial communications.

Standard control features include overspeed frequency regulation through intercept valves, overspeed trip condition, and high acceleration protection.

### Functionality

The 505LST's functionality includes:

- Speed Control
- Throttle Pressure Control
- Valve Position Control
- Full-arc-Partial-arc Transfers
- Valve Testing
- First-Out Shutdown Indication
- Valve Limiters
- Security—Program is password protected
- Remote Analog Setpoints for Speed and Valve Position Setpoints
- Critical Speed Avoidance
- Modbus® \* Communications
- Automatic Start
- Coordinated Control with Plant DCS
- Online Governor Valve Testing

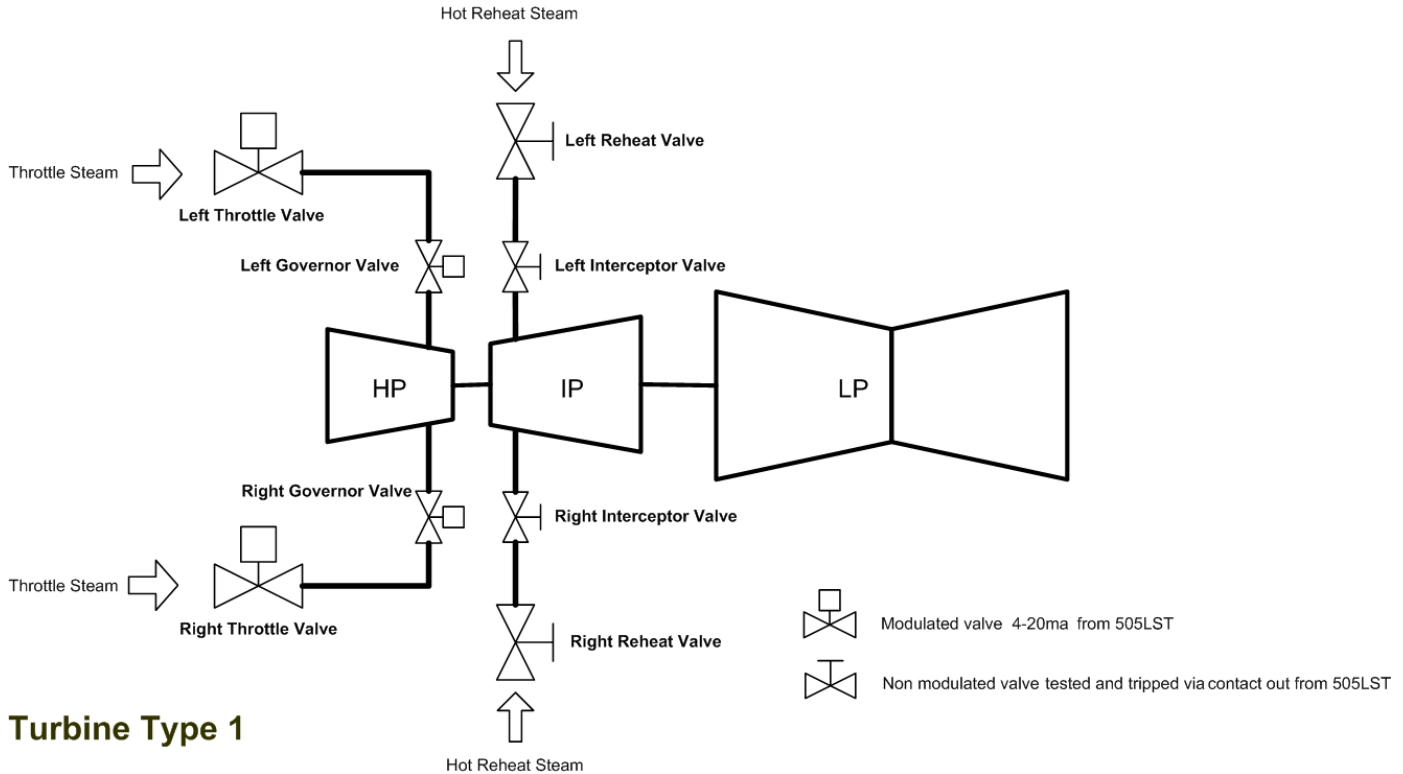
\*—Modbus is a trademark of Schneider Automation Ltd.



- Full-arc-partial-arc transfers
- Automated valve testing
- Controls up to 4 modulating valves (more with external drivers)
- User-friendly menu programming format
- Integral operator control panel
- Throttle pressure control
- Valve position control
- Modbus® communications
- Certified for Class I, Division 2, Groups A, B, C, D Locations
- Sulfur-resistant conformal coated

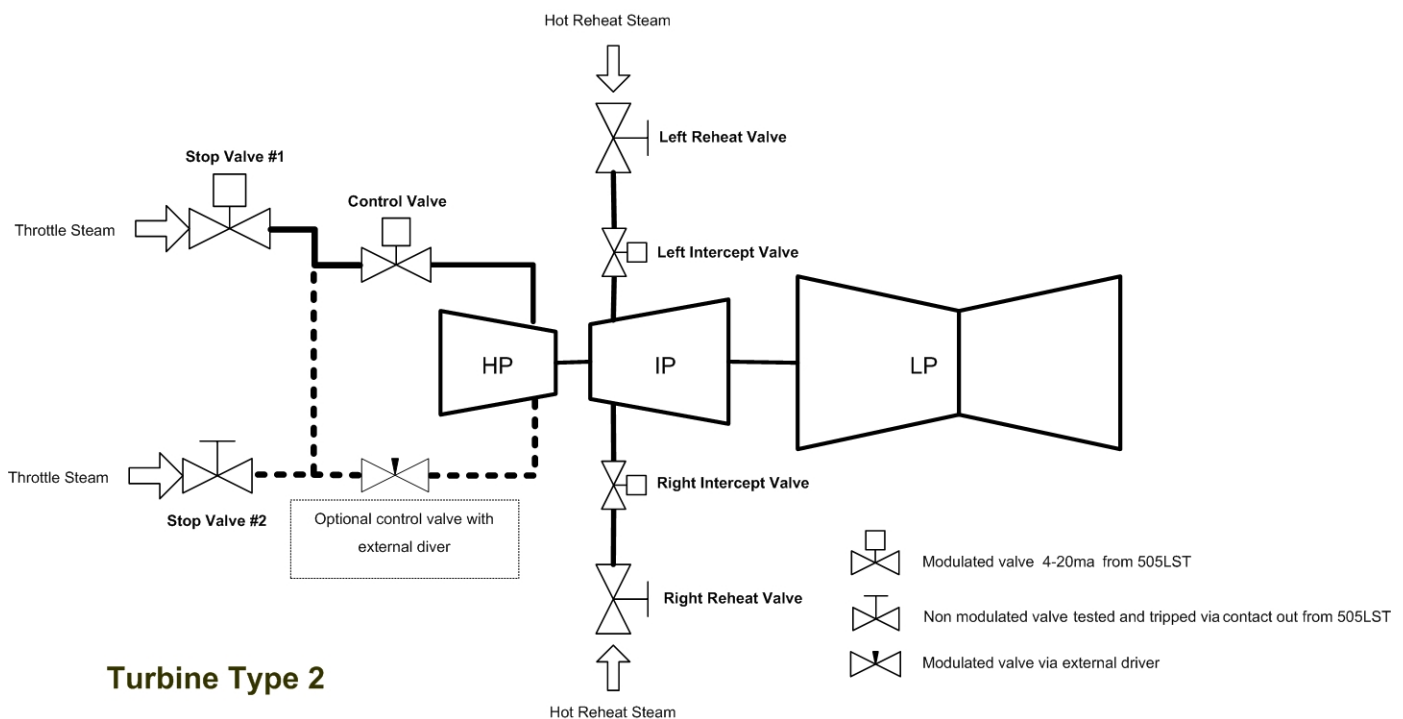
## Functional Block Diagrams

**Turbine Type 1:** 2 Throttle Valves (modulating control)  
 2 Governor Valves (modulating control)  
 2 Intercept Valves (relay output control)



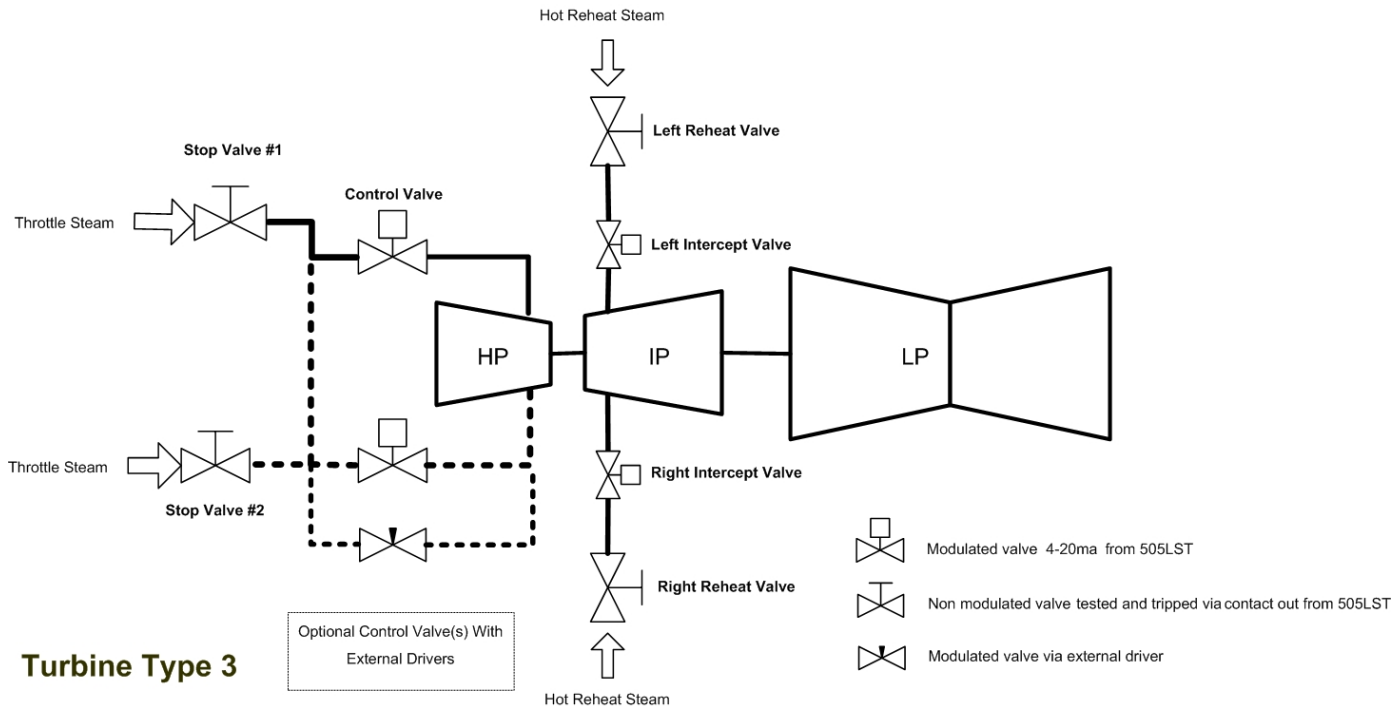
### Turbine Type 1

**Turbine Type 2:** 1 Stop Valve (modulating control), (second valve possible with External Driver)  
 1 Governor Valve (modulating control), (second valve possible with External Driver)  
 2 Intercept Valves (modulating control)  
 2 Intercept Valves (relay output control)

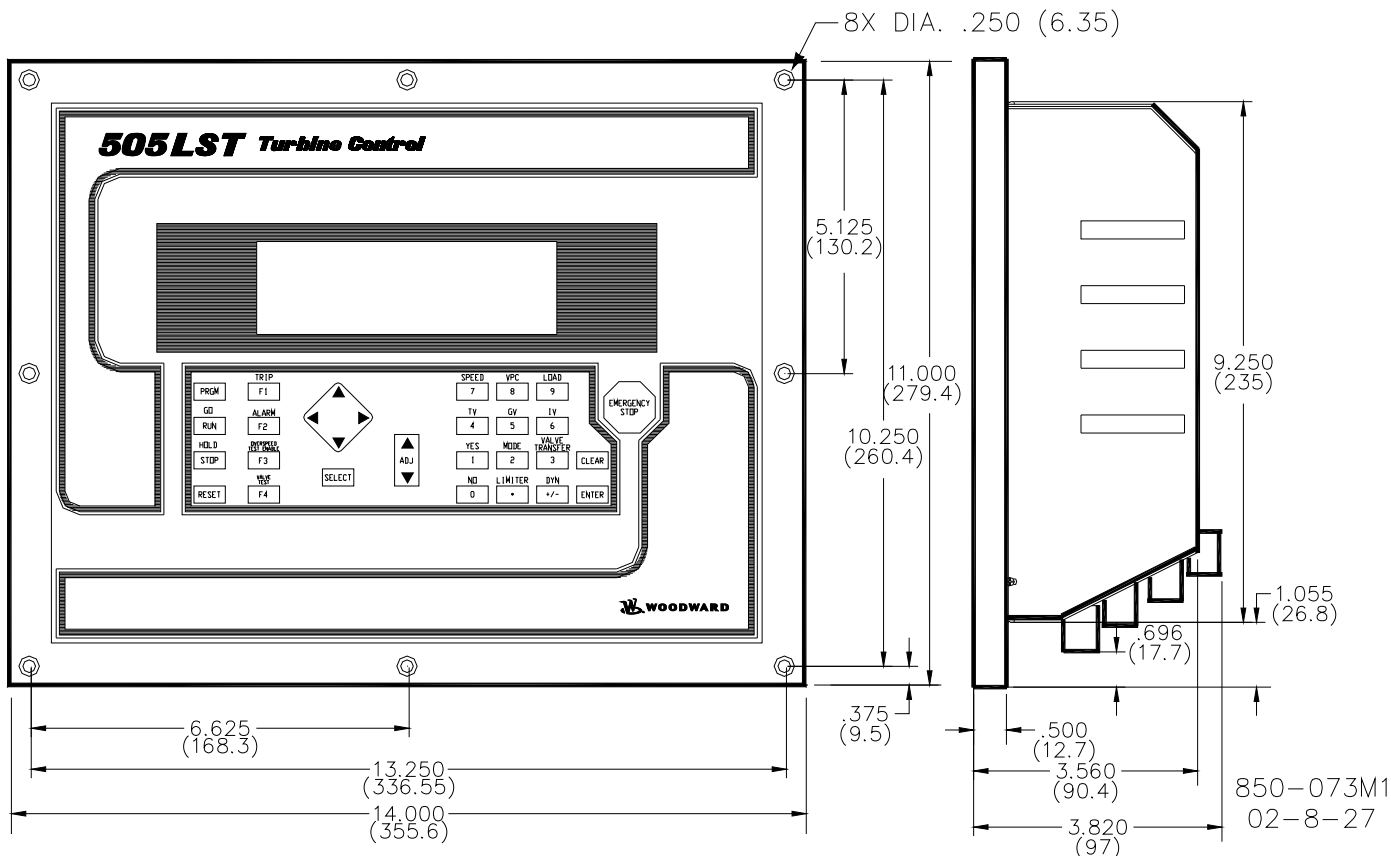


### Turbine Type 2

**Turbine Type 3:** 2 Stop Valves (relay output control)  
 2 Governor Valves (modulating control), (3 or 4 valves possible with External Drivers)  
 2 Intercept Valves (modulating control)  
 2 Reheat Stop Valves (relay output control)



**Turbine Type 3**



**505LST Outline Drawing**  
 (Do not use for construction)

## Control Specifications

### INPUTS

Power:	18–32 Vdc, 90–150 Vdc, 88–132 Vac (47–63 Hz), 180–264 Vac (47–63 Hz)
Speed:	2 MPUs (1–30 Vrms) or Proximity Probes (24 Vdc provided), 0.5 to 15 kHz
Discrete Inputs:	16 Dedicated Contact Inputs (24 Vdc wetting voltage)
Analog Inputs:	6 Dedicated 4–20 mA Current Inputs

### OUTPUTS

Valve/Actuator Drivers:	4 Actuator Outputs (4–20 mA)
Discrete Outputs:	8 Dedicated Relay Outputs (Form-C relay contacts)
Analog Outputs:	4 Dedicated Readouts (4–20 mA)

### COMMUNICATIONS

Serial:	2 Modbus (ASCII or RTU) Comm Ports (RS-232, RS-422, or RS-485 compatible)
PC Port:	1 RS-232 PC port for uploading/downloading program configurations

### ENVIRONMENTAL

Operating Temperature Range:	–25 to +65 °C
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Electromagnetic Compatibility:	Immunity—IEC 61000-4-2 Emissions—EN55011, Class A, Gr 1 Radiated RF Immunity—IEC 61000-4-3 Fast Transient Immunity—IEC 61000-4-4 Conducted RF Immunity—IEC 61000-4-6
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Shock:	US MIL-STD-810C Procedure 516.2, Procedure 1B
Vibration:	Lloyd's Register ENV2 Vibration Test 1 (0.7G, 5 to 100 Hz)
Humidity:	Lloyd's Register ENV2 Test #1
Salt Fog:	US MIL-STD-810 Method 509.2 Procedure 1

### Pollution Resistance

#### Particulate Pollution Resistance:

IEC 664-1 Pollution Degree 2 (Normally only nonconductive pollution occurs. Temporary conductivity caused by condensation is to be expected.)

#### Gaseous Pollution Resistance:

The polyacrylate conformal coating withstands NO<sub>2</sub>, CO<sub>2</sub>, SO<sub>2</sub>, and H<sub>2</sub>S gases per IEC 60068-2-60:1995 Part 2.60 Methods 1 and 4 (Flowing Mixed Gas Corrosion Test). It will withstand levels typical of telecommunications and computer installations as defined by Battelle Labs Class III (between IEC 60721-3-3 classification 3C1 and 3C2, light industrial to urban industrial, heavy traffic).

Size:	14" L X 11" H X 4" D (356 x 279 x 102 mm)
Mounting:	Bulkhead mounted
Location Rating:	NEMA 4
Agency Approvals:	UL/cUL Listed—Class I, Division 2, Groups A, B, C, D CE (18–32 Vdc version only)

Technical Manual 26440



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